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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,878	01/09/2002	Mark O. Neisser	2002US304	5290

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EXAMINER	
BARRECA, NICOLE M	
ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 08/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/042,878	NEISSER ET AL.	
	Examiner	Art Unit	
	Nicole M Barreca	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/5/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: PTO-892 Paper No. 6, mailed 7/2/2003

DETAILED ACTION

1. This is a new action mailed in response to the interview between Sangya Jain and Mark Huff on May 4, 2004. Please note that the correct patent number for Hyakutake in the 103 rejection is 6087250, as listed on the PTO-892 mailed with the rejection on 7/2/2003.

2. Claims 1-26 are pending in this application.

3. The 35 USC 112 second paragraph rejection of claims 4, 6, and 8 has been withdrawn in response to the applicant's amendments.

4. The IDS filed 8/5/2003 has been considered. Duplicate documents have been crossed out.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the BARC has a solids content of up to about 8% solids and a maximum coating thickness of the wavelength of light divided by twice the refractive index. It is unclear if this is weight, volume or mole percent solids. It appears from the specification that this was intended to be wt% and this is the interpretation used for this action.

In addition, the open-ended ranges for the solids content and layer thickness render the claim indefinite. While open-ended ranges are not always indefinite, the examiner is unable to determine from the teachings in the applicant's specification a clear definition of the lower limits. Is it possible to have a solids content of 0% ? How little solid is required to be present in order to still successfully form a film layer? Obviously the BARC layer cannot have a thickness of 0, so how thin can this layer be?

Response to Arguments

7. Applicant's arguments, see p.7-8, filed 10/10/03, with respect to the rejection(s)of claim(s) 1-26 with respect to the Padmanaban reference have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art, as discussed below.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-8, 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hause (US 6090694) in view of Meador (US 5919599) and Hyakutake (US 6087250).

10. Hause discloses a patterning method. Organic ARC layer 160 is spun on a wafer and baked, followed by photoresist layer 1709. The photoresist and ARC are exposed

to UV light through a mask. The pattern is developed in both the resist and ARC to form via openings. A positive photoresist process is described, but a negative photoresist could also be used (col.2, 7-16, col.4, 1-27). Hause is silent on the solids content and thickness of the ARC layer. Meador teaches that the solids content of an ARC composition is typically adjusted typically to about 2.5-10 wt % in order to achieve the desired 500-2500 angstrom film thickness (col.7,36-39), thereby establishing ARC solids content a result-effective variable. Hyakutake teaches that the thickness of the antireflective layer depends on the wavelength of the exposure light (col.3, 16-18) and is therefore a result-effective variable. It would within the ordinary skill of one in the art to determine the optimal solids content and film thickness of the ARC layer in the method Hause by routine experimentation and to a solids content up to about 8% and a maximum coating thickness of the wavelength of light divided by twice the refractive index, if required, because the solids content and thickness of an ARC layer are a result-effective variables, as taught by Meador and Hyakutake, respectively and the discovery of an optimum value of a result effective variable is ordinary within the skill of the art, as taught by *In re Boesch*, (617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

11. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hause in view of Meador and Hyakutake as applied to claim 1 above, and further in view of Puligadda (US 6,323,310).

12. Hause discloses an organic BARC but is silent on the specific ARC composition and does not disclose that the BARC composition comprises a polymer-bound or nonpolymer-bound dye. Puligadda teaches that BARC compositions typically consist of

an organic polymer which provides coating properties and a dye for absorbing light. Puligadda also teaches that the dye is either blended into the composition (nonpolymer-bound) or chemically bounded to the polymer (col.1, 27-33). It would have been obvious to one of ordinary skill in the art to have the BARC composition in the method of Hause (in view of Meador and Hyakutake) comprise a dye because Puligadda teaches that BARC compositions typically consist of an organic polymer which provides coating properties and a dye for absorbing light. It would have also been obvious to one of ordinary skill in the art to have the dye be polymer or nonpolymer bound because Puligadda teaches that dyes are either blended into the composition or chemically bound to the polymer.

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hause in view of Meador and Hyakutake as applied to claim 1 above, and further in view of Dichiara (US 5482817).

14. Hause is silent on the ARC composition and does not disclose that the BARC composition comprises a polymer derived from the claimed Markush group. Dichiara teaches that an antireflective composition comprising a polymer of polyvinylnaphthalenes, such as 2-vinylnaphthalene,is highly absorbent to mid and deep UV light (col. 2, 11-27, example 3). It would have been obvious to one of ordinary skill in the art to have the ARC composition in the method of Hause (in view of Meador and Hyakutake) comprise a polymer derived from 2-vinylnaphthalene because Dichiara teaches that such an ARC composition is highly absorbent to mid and deep UV light.

15. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hause in view of Meador and Hyakutake as applied to claim 1 above, and further in view of Samuels (US 6268907).

16. Hause does not disclose baking the resist between the exposure and development steps. Samuels teaches that it is known in the prior art to perform a post-exposure bake (PEB) in order to eliminate standing waves (col.2, 7-19). It would have been obvious to one of ordinary skill in the art to perform a PEB on the resist in the method of Hause (in view of Meador and Hyakutake) because Samuels teaches that this is a conventional step in the prior art known to eliminate standing waves.

17. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hause in view of Meador and Hyakutake as applied to claim 1 above, and further in view of Brown (US 5882967).

18. Hause is silent on the developer used and does not disclose using tetramethylammonium hydroxide (TMAH) for the developer. Brown teaches that in a typical photolithographic process, the photoresist is developed with TMAH (col.1, 46-59). It would have been obvious to one of ordinary skill in the art to use TMAH as the developer in the method of Hause (in view of Meador and Hyakutake) because Brown teaches that TMAH is a conventional developer in the photolithographic art.

19. Claims 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hause in view of Meador and Hyakutake as applied to claim 1 above, and further in view of Malik (US 6,312,870).

20. Hause is silent on the specific photoresist and does not disclose that the photoresist composition comprises an acrylate, methacrylate, or a polyhydroxystyrene polymer. Malik teaches that photoresist compositions containing copolymers of t-butyl acrylate or methacrylate and hydroxystryrene monomers are known in the art (col.1, 17-19). It would have been obvious to one of ordinary skill in the art to use a photoresist composition comprising an acrylate, methacrylate, or a polyhydroxystyrene polymer in the method of Hause (in view of Meador and Hyakutake) because Malik teaches that photoresist compositions containing copolymers of t-butyl acrylate or methacrylate and hydroxystryrene monomers are known in the art.

21. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hause in view of Meador and Hyakutake as applied to claim 1 above, and further in view of Yoon (US 6,537,727).

22. Hause is silent on the specific photoresist and does not disclose that the photoresist composition comprises a cycloolefin/maleic anhydride copolymer. Yoon teaches that a cycloolefin/maleic anhydride copolymer is a conventional resist composition (col.1, l.66-col.2, l.4). It would have been obvious to one of ordinary skill in the art to use a photoresist composition comprising a cycloolefin/maleic anhydride copolymer in the method of Hause (in view of Meador and Hyakutake) because Yoon teaches that a cycloolefin/maleic anhydride copolymer is a conventional resist composition.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Holmes (US 6319651) discloses a patterning process wherein the photoresist and ARC may be developed in a single step.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday (8:00 am-6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Nicole M. Barreca
Examiner
Art Unit 1756

7/23/04